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# Electric Mobility in Germany

**Ertrac conference**

**Brussels march 2011**

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# Challenges in the automotive industry and potentials of electric vehicles

**Meeting climate and sustainability targets 2020 and beyond.**

**Maintaining and enhancing innovative potentials in the automotive industry as a lead sector**

- Helping to modernise industries for the future
- Boosting demand for low carbon technologies
- Interconnect car industry with energy suppliers, IT companies and other players

**Reducing dependency** on oil and gas imports

**Increasing the share of renewable energy sources** in transport

**Improving grid stability** through V2G and facilitating the integration of intermittent energy sources

**Meeting climate targets** with highest resource efficiency

**Reducing GHG emissions,** pollutants and noise

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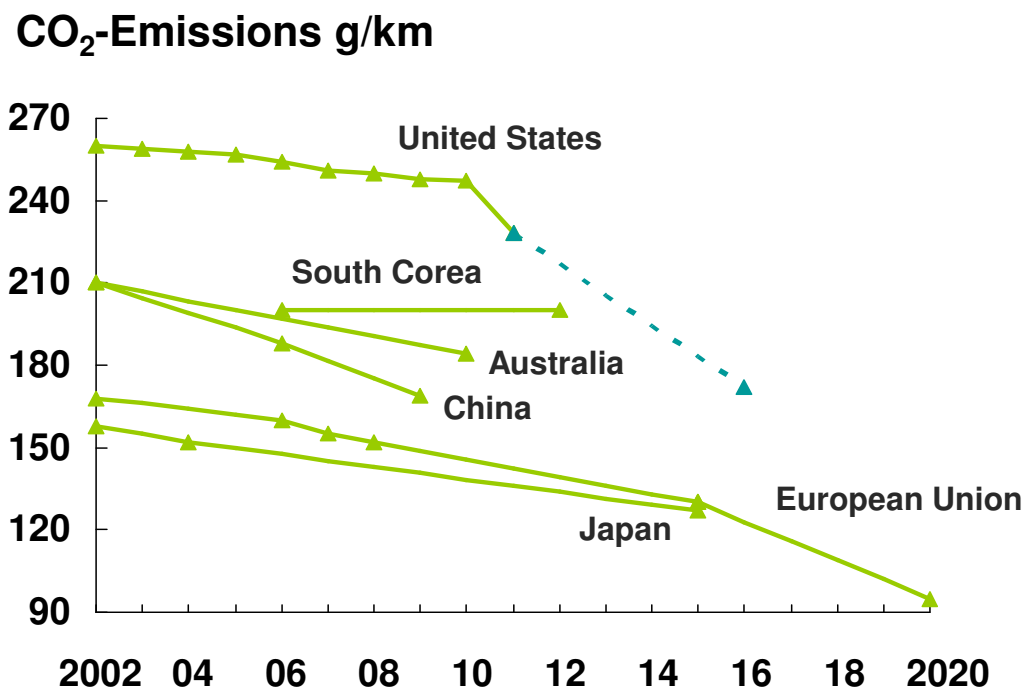
# International $CO_2$ targets for the automotive industry




**Main findings**

- Strictest regulation in Japan
- EU 2020 with most restrictive fleet emission targets
- US with highest relative reduction
- Yet, existing standards will not comply with a 2-degree climate target in the long run

Mark: Dashed lines refer to targets in discussion.
Source: ICCT, May 2009

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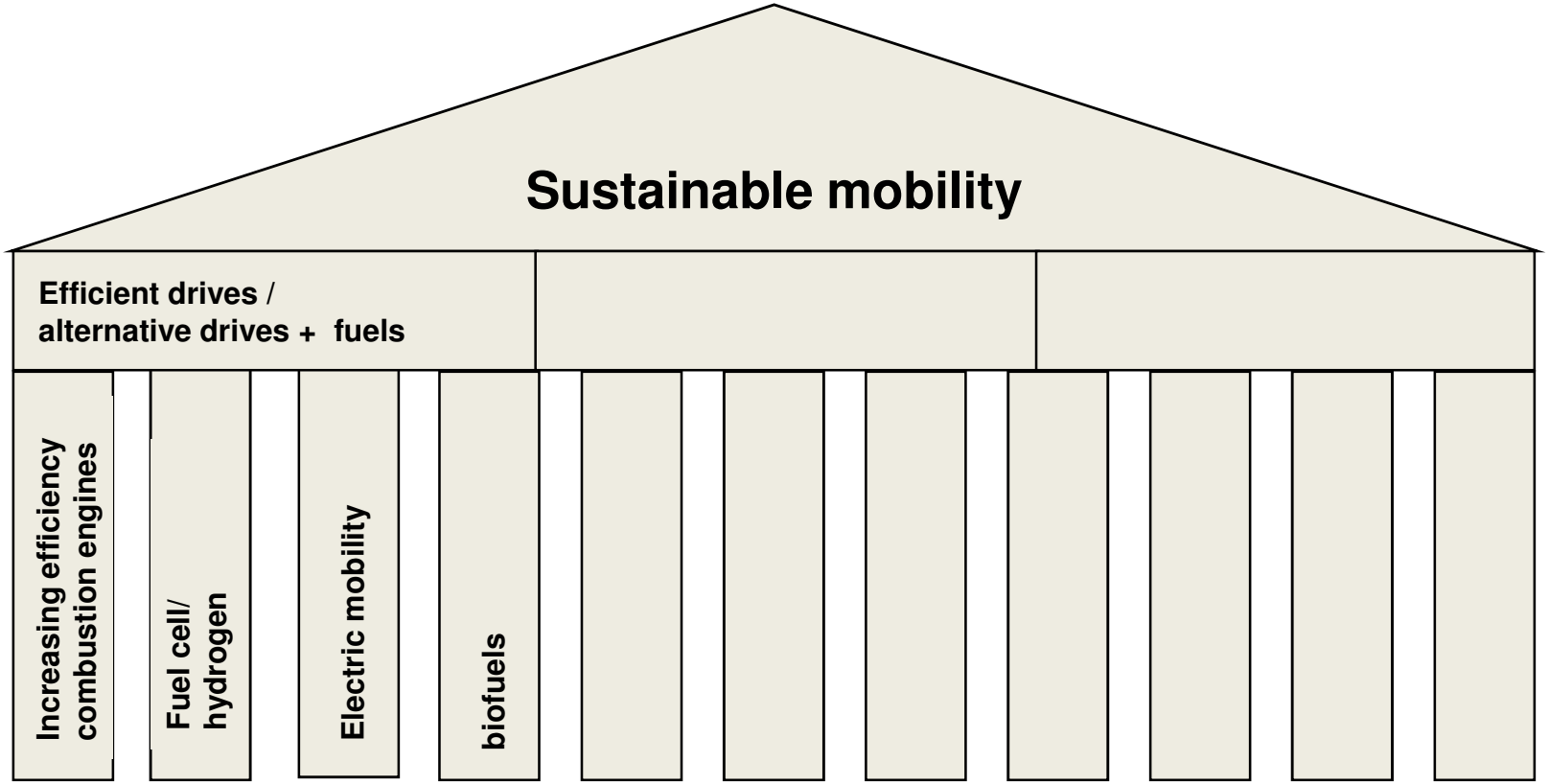
# E-Mobility as another pillar of sustainable mobility



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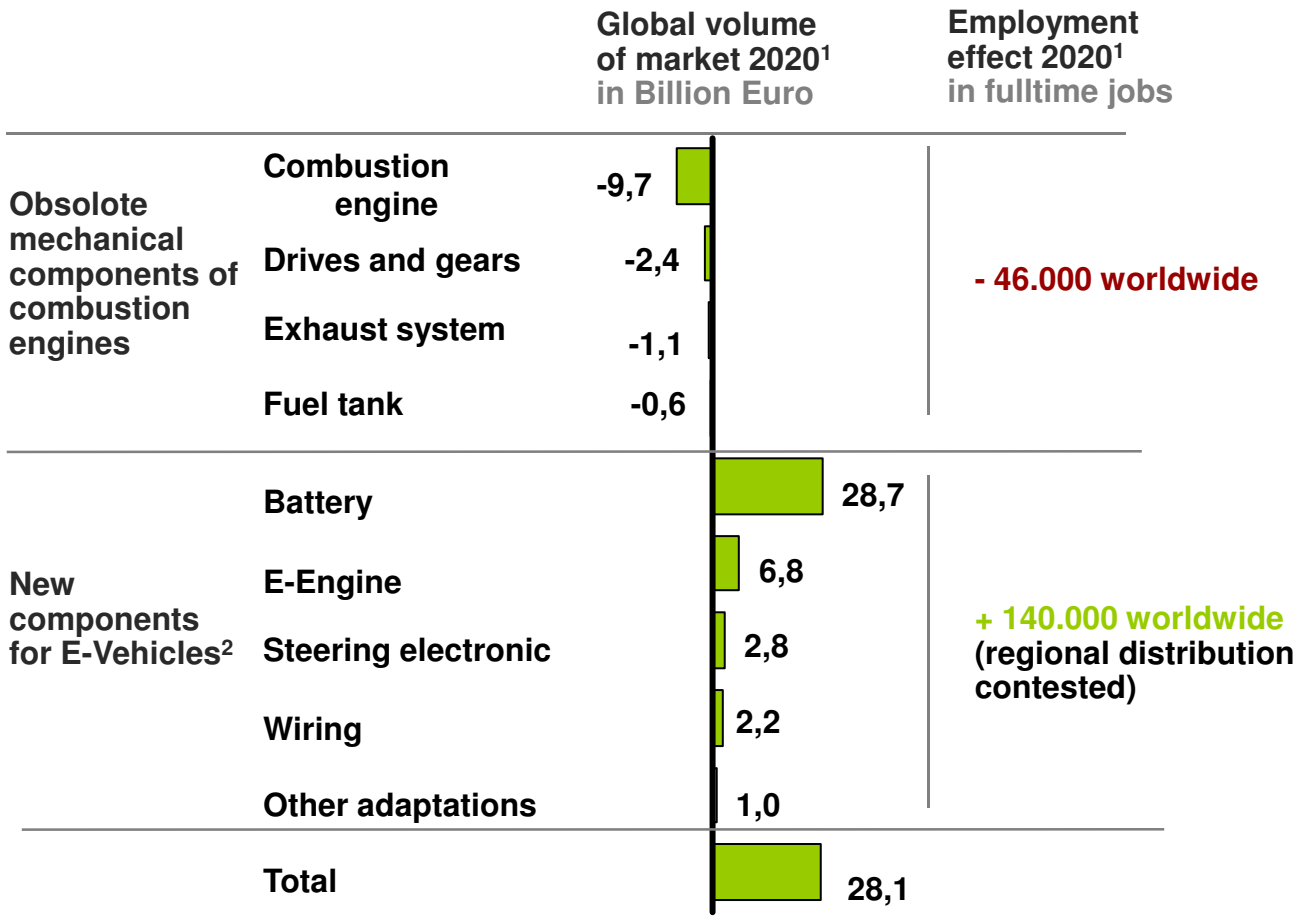
# E-Vehicles substantially transform the value chain




Source: McKinsey 2009

1 Assumption: Global annual sale of 7 Mio. E-Vehicles in 2020.

# Advances in Germany

- ⇨ Electric mobility as part of the Government‘s Integrated Energy and Climate Programme (December 2007)
- ⇨ Establishing the **Ministerial Cooperation on Electric Mobility** (Fed. Ministries of Economy, Transport, Environment and Research)
- ⇨ Supporting **first fleet tests** in Berlin (June 2008)
- ⇨ **National Strategy Conference** Elektric Mobility (November 2008)
- ⇨ **Stimulus Package II** € 500 mn € until 2011 (January 2009)
- ⇨ **National Development Plan for Electric Mobility** (August 2009)
- ⇨ **FedGov‘s Joint Unit for Electric Mobility** (February 2010)
- ⇨ **National Platform for Elektric Mobility** (Mai 2010, first recommendations end 2010)

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# National Development Plan for Electric Mobility

The **National Development Plan for Electric Mobility** is to

- contribute to climate protection, grid stability and extended use of renewable energy
- safeguard market leadership of the German automotive and supply industries
- maintain competitiveness by innovation along the new value chain for electric mobility
- leverage new urban mobility and road transport concepts based on less fossil fuels
- raise public awareness and acceptance of change

**Important milestone is to put one million EV and PHEV on Germany's roads by 2020**

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# Central fields of action in the Development Plan

## Energy Storage

- Lower battery costs
- Enhance energy density
- Extend life cycle
- Improve safety

## Vehicle Technology

- Development & improvement of electric components
- Electrification of ancillary units

## Grid Integration

- Build up charging facilities
- Introduce IT technologies
- 1. step: Time sensitive charging
- 2.step: Feeding back to grid

## Framework conditions

- Education and skills
- Battery recycling
- Standardisatio n of plugs i.a.
- Regulation laws (identify appropriate locations for facilities i.a.)

## Markets

- Develop business cases
- Accelerate market penetration
- Support market preparation

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# Roadmap electric mobility in the Development Plan

| | **Market preparation** (2009 - 2011) | **Market activation** (appr. 2011 – 2016) | **Market penetration** (appr. 2017 – 2020) |
|---|---|---|---|
| **Batteries** | • Start of production 1. generation Li-Ion-batteries<br>• Technology advance 2. generation Li-Ion-Batteries | • Mass production 1. genration Li-Ion-Batteries<br>• Start of production 2. generation Li-Ion-batteries | • Mass production 2. genration Li-Ion-Batteries<br>• Basis of new battery technologies to to improve cost effectiveness and energy density |
| **Vehicle technology** | • Manufacturing of PHEV and BEV prototypes<br>• Drive technologies according to engine power, construction constraints, safety and reliability | • Manufacturing of PHEV and BEV by all OEMs in small batches<br>• Platform maturity of 2. generation PEV / BEV<br>• Minimising costs for drive technologies | • Mass production of 2. generation PHEV / BEV<br>• Manufacturing of BEV / PHEV in superior vehicle classes |
| **Infrastructure** | • Testing grid integration<br>• Initial public charging devices<br>• Examination and demonstration of renewable energy supply | • Charging devices across many regions<br>• Grid integration<br>• Linking of renewable energy supply | • Comprehensive nationwide charging infrastructure<br>• Full grid integration with energy recovery<br>• Quick-charging, wireless energy transfer |
| **Framework conditions** | • Safety standards<br>• Regulative policy framework<br>• Standardisation of interfaces | • Market incentives<br>• Procurement guidelines for the public sector | |
| **Market development** | • Application in fleet trials | • Initial private users<br>• Business case for charging, energy recovery and batteries | • 1 million e-cars in use by 2020 in Germany<br>• Germany as lead market for electric mobilty |

# Focal fields of subsidies

| | |
|---|---|
| **Ministry of Economics and Technology** | ▪ Energy research (i.e. energy storage and grid integration)<br>▪ IT systems providing grid integration (E-Energy)<br>▪ Transport research (i.e. drive components,demonstrations) |
| **Ministry of Transport** | ▪ 8 model regions across Germany<br>▪ Battery test centre |
| **Ministry of Environment** | ▪ Fleet tests in individual and business-related transport<br>▪ Recycling of Li-Ion traction batteries<br>▪ Commercial launch programme for hybrid buses |
| **Ministry of Research** | ▪ Development of production technologies for Li-Ion-cells / battery systems<br>▪ Network of excellence in systemic research electric mobility<br>▪ Development of research centres on electro-chemistry |

- Demonstration projects in Germany

- In total 17 demonstration regions in Germany financed by the federal government (2009-2011)

7 demonstration regions with a focus on ICT (information and communication technology)

- How does the integration in the energy supply grids work?
- We have a rapid development of renewable energies in the electricity mix. What does this mean for electromobility?
- Intelligent control of charging outside peak load periods
- Vehicle battery as a storage component with feedback capability
- ICT for control and billing systems

Volume: 100 million euros

8 demonstration regions with a focus on the transport aspect (financed mainly by the Fed. Ministry for Transport, BMVBS; volume: 115 million euros)

- integration of producers and customers in local public transport
- acquisition of knowledge about patterns of use
- integration of different transport options
- development of new business fields

2 demonstration regions in Berlin (financed mainly by the Fed. Ministry for Environment Protection, BMU; volume: 70 million Euros)

- Other activities
- - e.g. model regions of the federal states. Example: Bavaria has chosen two smaller cities as demonstration areas
- - private models e.g. BMW: 650 vehicles worldwide run in Germany, USA, Great Britain, France, Japan and China.

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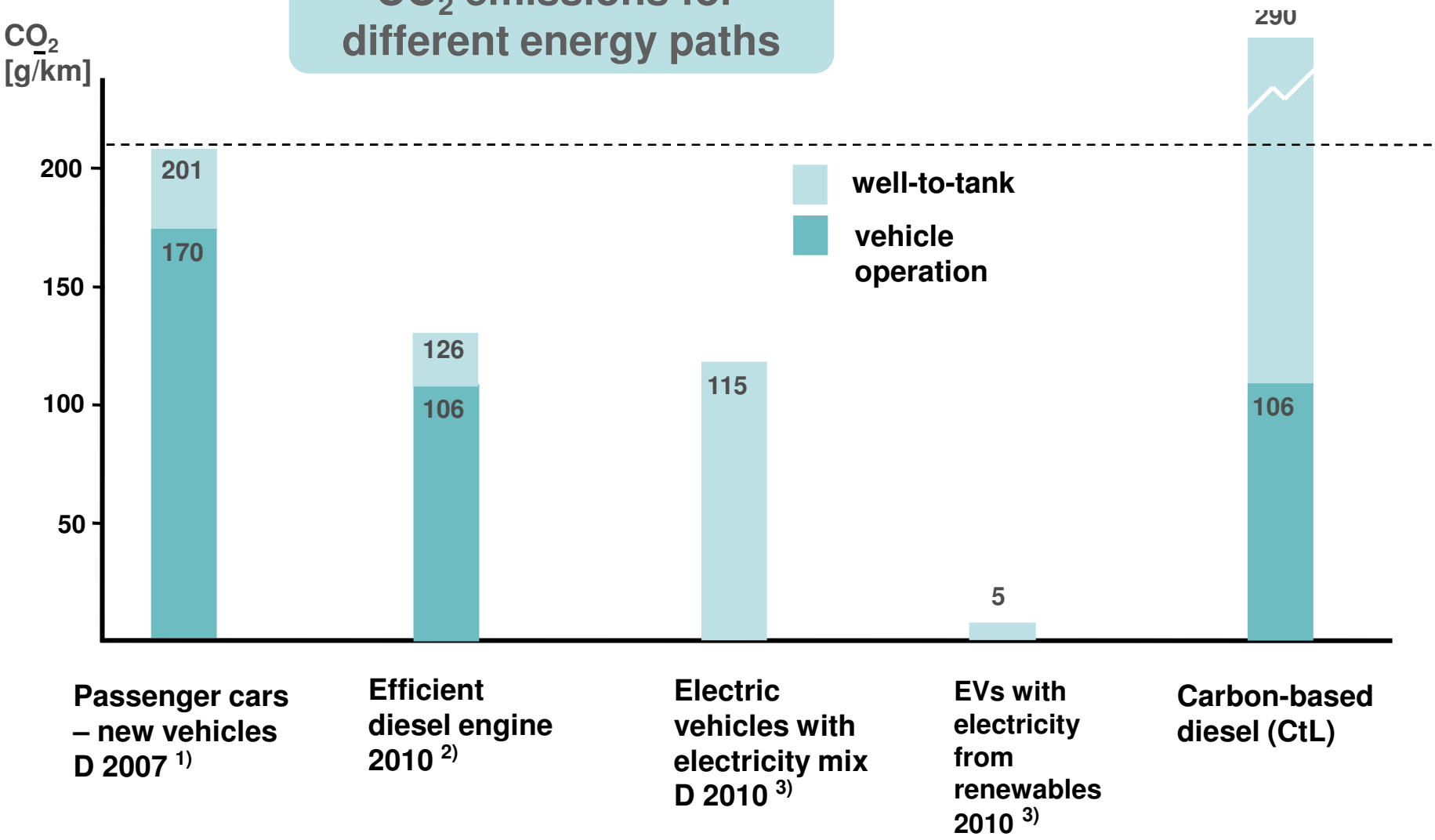
# $CO_2$ emissions for different energy paths




1) Source: KBA, conventional fuel 2 ) Consumption: 4 l/100 km, conventional fuel 3) Electricity needed: 18 kWh/100 km

# Next steps

- ⇨ Rapid assignment of fundings from the Stimulus Package II
- ⇨ Joint commitment in the National Platform (first results 2010)
- ⇨ International Strategy Conference presumably in 2011
- ⇨ Consolidating the trajectory of electric mobility
  - ⇨ industry (notably OEM and utilities)
  - ⇨ research
  - ⇨ politics
- ⇨ Preparing the next phases of the Development Plan

# Main conclusions

- **Electric mobiliy is about to take off** - worldwide
- **Battery is the core element** of the value chain and crucial to user acceptance, thus market penetration
- Strengthening competences in battery technology is paramount in international competition
- Long term climate targets require **enhanced electrification of transport**
- Here, electric vehicles substantially contribute only when running on **renewable electricity**
- Symbiotic development of EV and renewables is possible and desirable
- 1. phase of the National Development Plan as important step

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# Thank you for your kind attention!